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C03B 9/453

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(54) Individual section glass blowing machine with moving dead-plate

(57) A section of an I.S machine comprises a blank station, (A, fig 1) at which the parison is formed, an intermediate station B, at which reheating may take place and a final forming station C at which a container is finally formed in a blow mould 11, the three stations lying in a straight line. The blow mould is arranged to move backwards and forwards between the intermediate station B (where the mould 11 is closed around a parison) and the final forming station C. Supporting means 24 at the final forming station supports a finally formed container while a dead plate 22, which moves with the blow mould, moves into the final forming station, and then the supporting means 24 releases the container onto the dead plate 22.

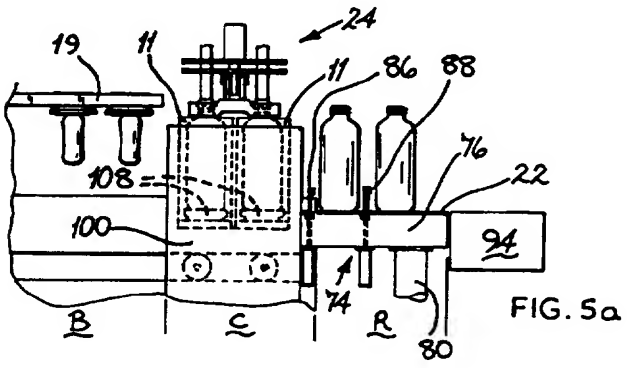

FIG. 5a

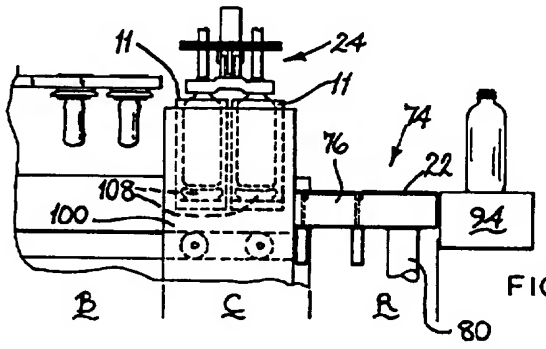

FIG. 5b

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

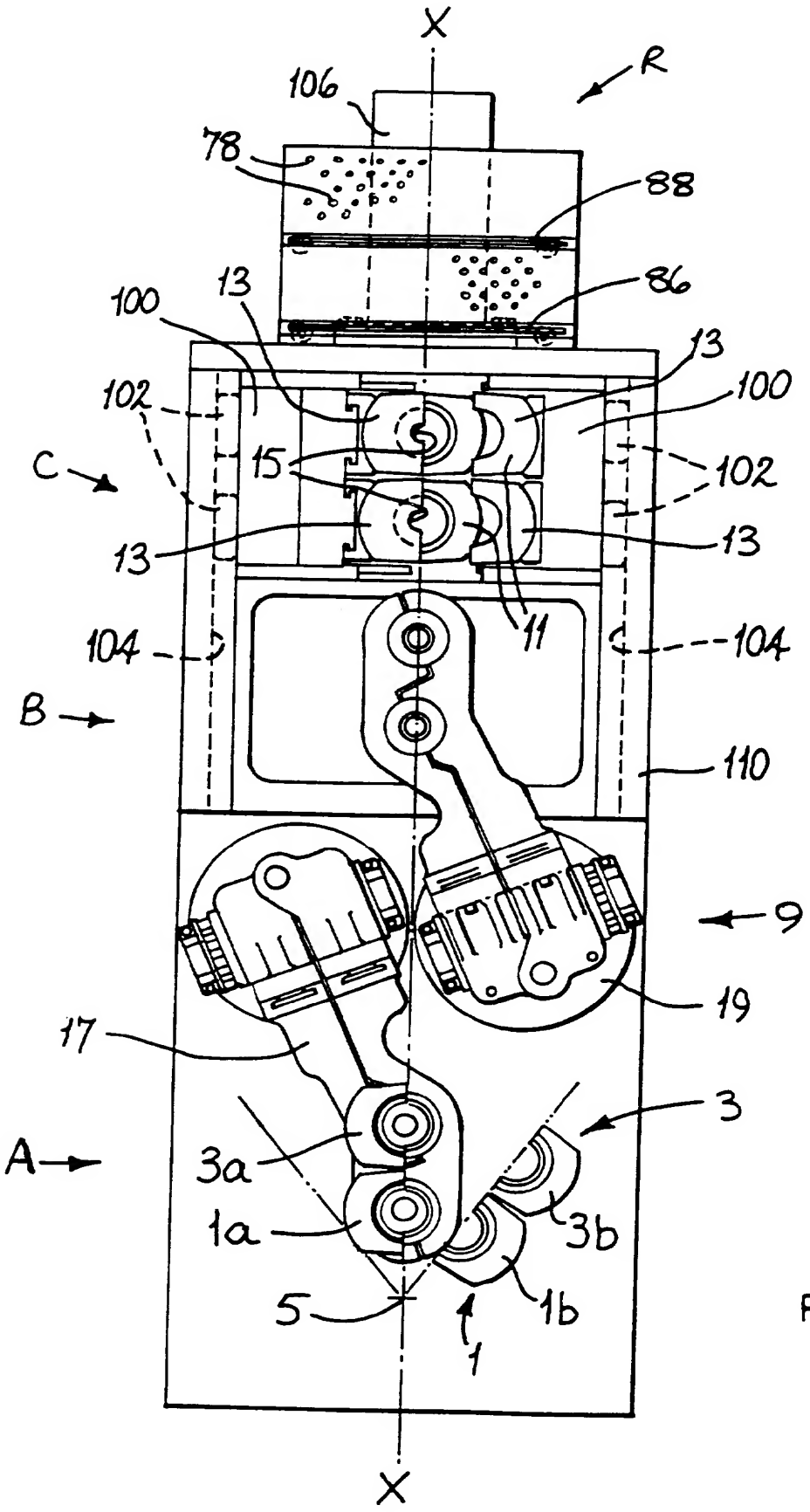
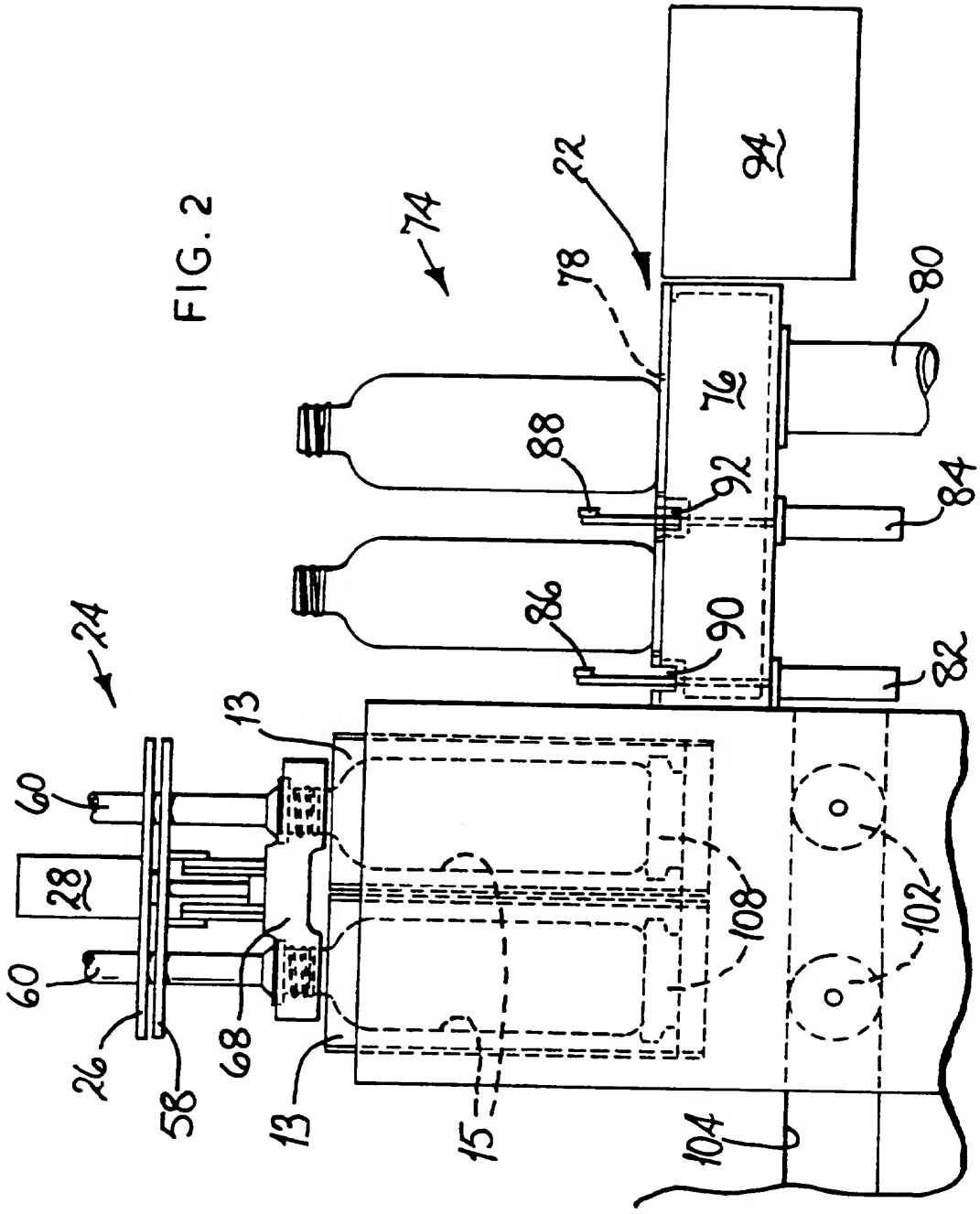


FIG. 1

FIG. 2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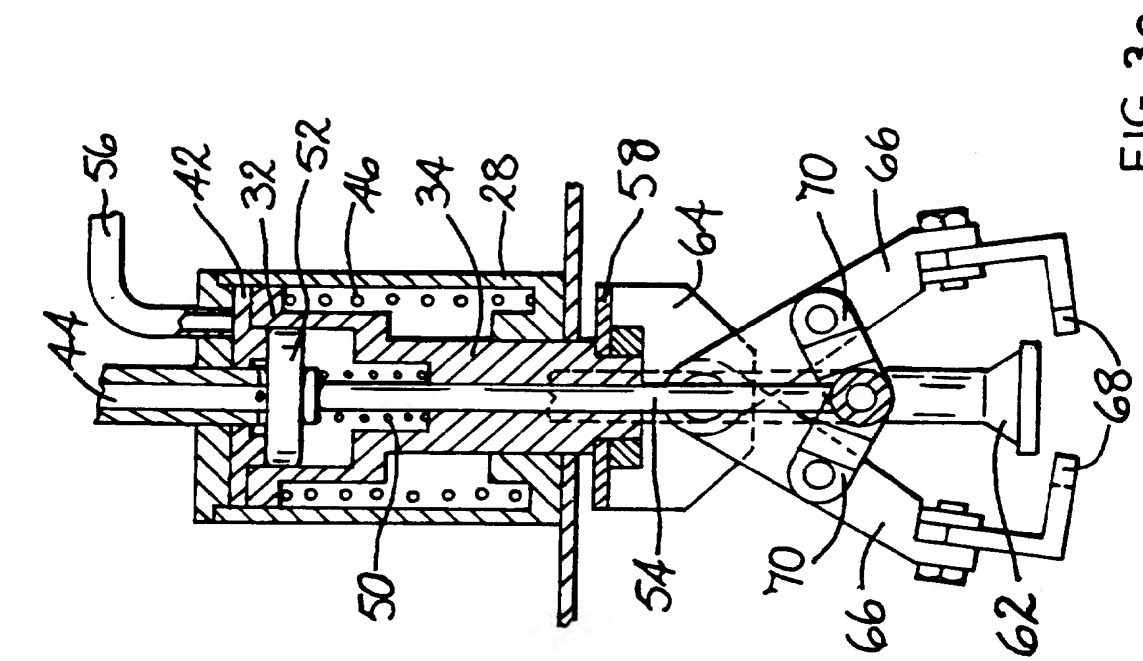
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FIG. 3a

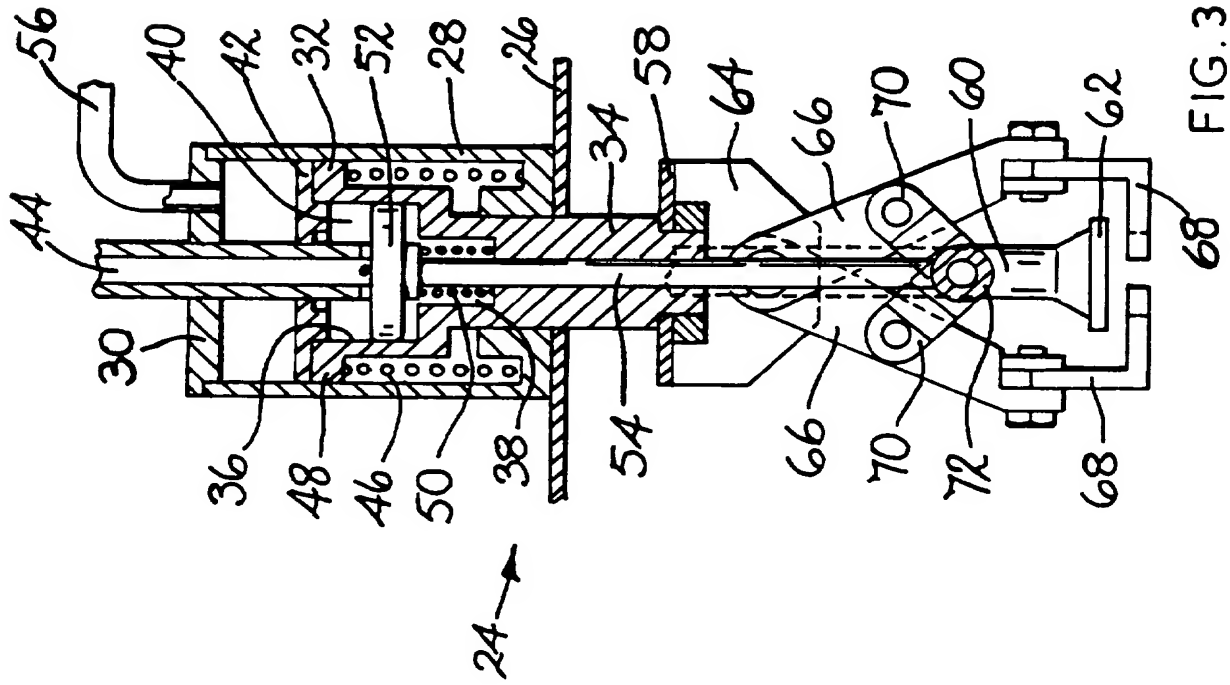
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FIG. 3

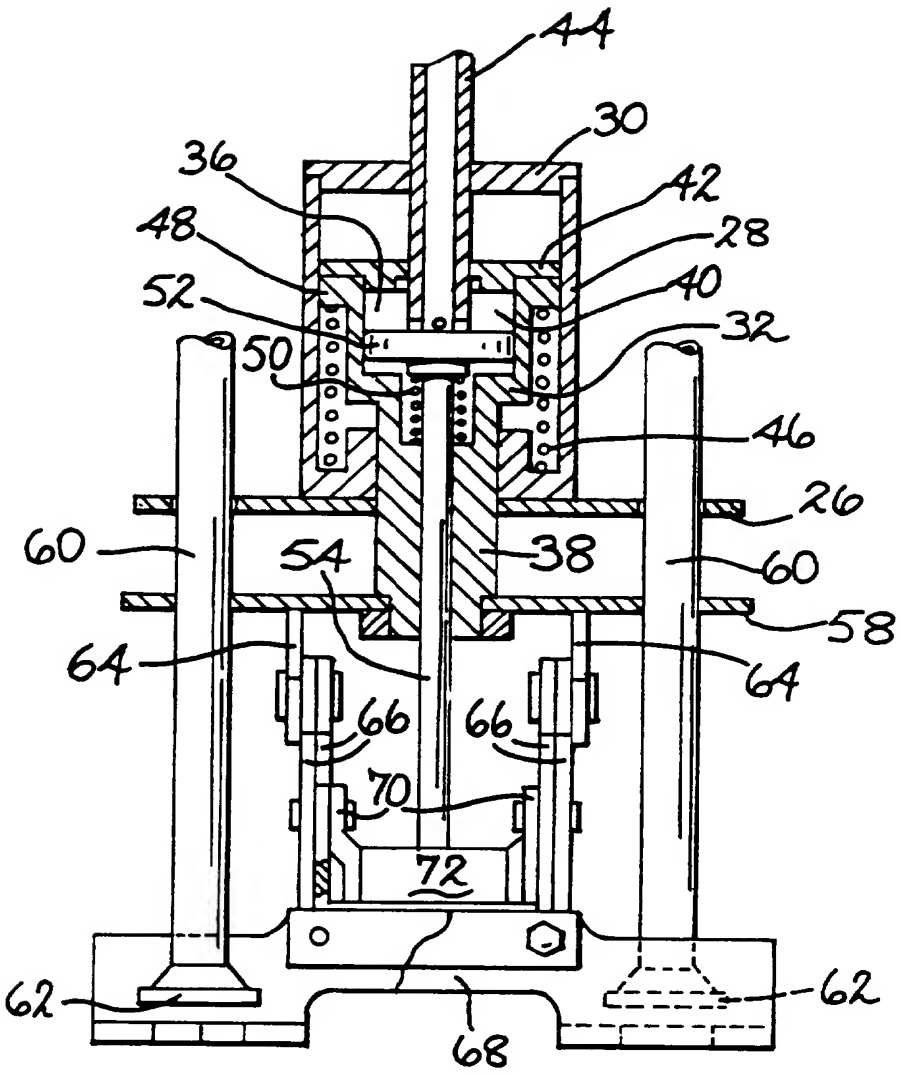
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FIG. 4

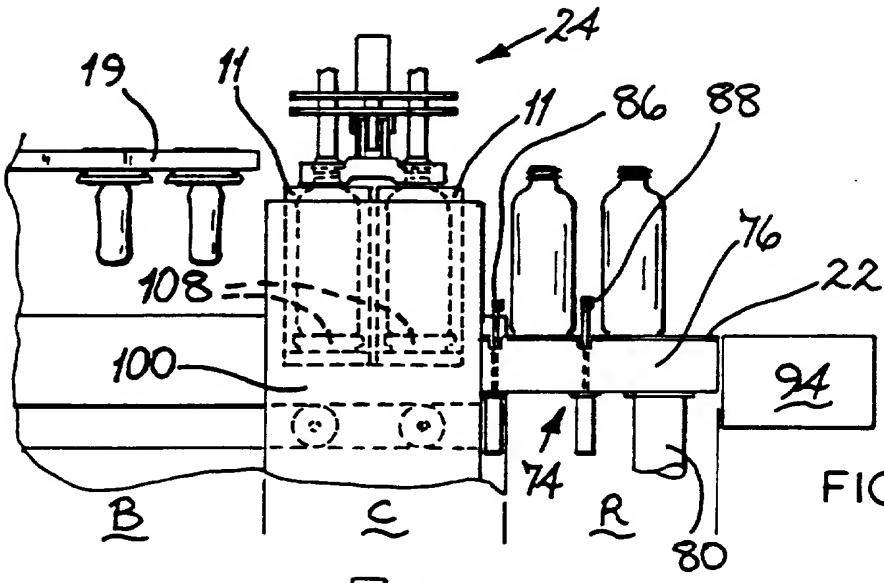

FIG. 5a

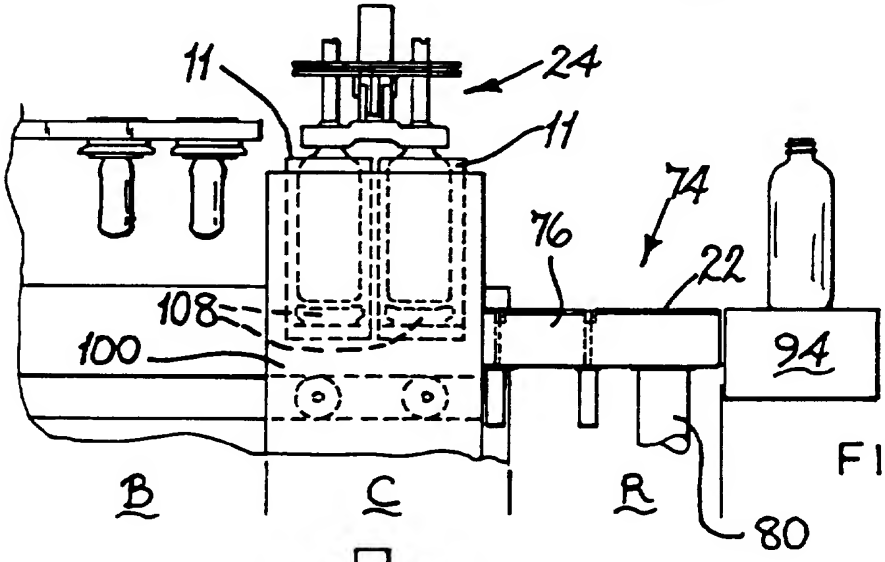

FIG. 5b

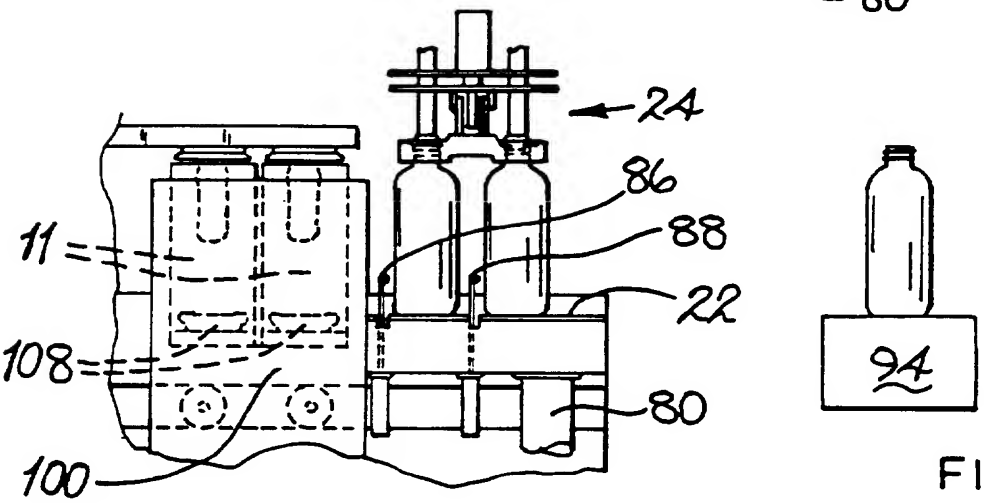

FIG. 5c

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IMPROVEMENTS IN THE MANUFACTURE OF GLASS CONTAINERS

This invention is concerned with improvements in the manufacture of glass containers.

A conventional I. S. glass container machine comprises a series of sections arranged along side each other and operating out of phase with each other. Each section is equipped with a single parison transfer mechanism carrying one or more neck-rings. Taking single gob operation as an example, the machine cycle commences with the neck-ring in a reverted position and the parison mould closed around it. A charge or gob of glass enters the upper end of the parison mould and is blown or pressed into a parison shape with some glass being forced into the space between the neck-ring and a plunger to form a finish end portion of the final container. The parison mould then opens leaving the parison held by its finish end in the neck-ring. The invert mechanism then operates to carry the parison from the parison forming station and to invert it into the blow mould station where the blow mould closes around it. The neck-ring is then opened, dropping the parison into the blow mould where it is supported by a bead formed on the finish. The invert mechanism returns the neck-ring to the parison forming station and the parison mould closes around it ready for the next charge of glass. Meanwhile the parison hanging in the blow mould is reheating, that is to say the outer, cooler, skin of glass which gives it its shape retaining ability and thus allows it to be transferred without excessive distortion from the blank mould to the blow mould, receives heat from the hotter interior glass and softens. This allows the body of the parison to stretch under its own weight and its outer surface to achieve a condition at which the parison can be blown into a final container. Blowing of the container then takes place, the tongs of a takeout

mechanism engage the finish of the formed container and the blow mould is opened. The takeout mechanism then removes the container by movement through a vertical arc, and deposits the container on a dead plate. Air is blown up through the dead plate to cool the blown container, usually in sufficient quantity to support the container until it has been adequately cooled when it is pushed out from the dead plate onto a conveyor which carries it to an annealing lehr.

The process just described suffers from certain disadvantages. Engagement of the tongs of the take out with the finish of the newly formed container and the stresses placed on the container during its movement by the takeout mechanism in a vertical arc can impose high loads on the newly formed container, resulting in distortion, particularly of the finish, and consequent production of an unsatisfactory container.

In our copending application 9420014.4 (4 October 1994) there is described a section of an individual section glass forming machine comprising a blank station, at which a gob of glass may be formed into a parison, a transfer mechanism for transferring a formed parison from the blank station to an intermediate station, and a final forming station at which a container is finally formed in a blow mould assembly. The blow mould assembly is arranged to move linearly between the intermediate station at which it engages the parison and the final forming station.

Such a machine may be equipped with a conventional takeout mechanism as described above, in which the blown containers are removed by movement in a vertical arc. However, even though containers formed in such a section are usually cooler, and thus less liable to damage than containers formed in a conventional IS machine as described

above, there is still the possibility of damage to the formed container resulting from the takeout movement.

It is an object of the present invention to provide an improved section in which the risk of damage to a container on its passage from the blow mould to the conveyor is reduced.

The present invention provides a section of an individual section glass forming machine comprising

a blank station, at which a gob of glass may be formed into a parison

a transfer mechanism for transferring a formed parison from the blank station to an intermediate station

a final forming station at which a container is finally formed in a blow mould assembly comprising blow mould members adapted to form a blow mould cavity, which blow mould assembly is arranged to move linearly between the intermediate station and the final forming station

container supporting means at the final forming station arranged to engage a container formed in the mould cavity and to support it

a dead plate moveable between the final forming station and a removal station,

wherein in the operation of the section

(a) the blow mould members open when the container is finally formed in the blow mould assembly at the final forming station and the container is engaged by the supporting means

(b) while the supporting means supports the container at the final forming station the blow mould assembly is moved from the final forming station to the intermediate station and the dead plate is moved from the removal station to the final forming station

(c) the supporting means releases the container onto the dead plate at the final forming station.

(d) the dead plate moves from the final forming station to the removal station to carry the container out from the final forming station.

There now follows a description of a section of an IS machine embodying the invention.

In the accompanying drawings,

Figure 1 shows, somewhat diagrammatically and with some parts omitted, a plan view of a section embodying the invention.

Figure 2 shows a side view of a final forming station end of the section of Figure 1.

Figure 3 shows, diagrammatically, an end view of a combined blowhead and tong mechanism of the section of Figure 1.

Figure 3a shows the mechanism of Figure 3 in another stage of operation.

Figure 4 shows a side view of the mechanism of Figure 3.

Figures 5a, 5b, 5c show three stages in the operation of the section of Figure 1.

Figure 1 shows somewhat diagrammatically a section of an individual section glass forming machine with some mechanisms omitted. Such a machine will comprise a number of such sections arranged side by side and arranged to operate out of phase with each other so that a continuous supply of formed glass containers is provided by the machine. I.S. machines comprising up to 12 sections each are now used commercially.

The section comprises a blank station A at which a charge of glass supplied from conventional gob forming and

distribution devices may be formed into parisons in parison moulds. The illustrated section is a 'double gob' section, that is to say it is adapted to operate on two gobs at a time, and thus comprises two parison moulds 1,3, each comprising two parison mould members 1a, 1b, 3a, 3b which are of conventional construction, being movable between an open and a closed position about a pivot 5.

The section also comprises an invert mechanism 9 for transferring formed parisons from the blank station A to an intermediate station B at which reheating of the parisons may take place, and a final forming station C in which containers are finally formed in blow moulds 11 comprising blow mould members 13 adapted to form blow mould cavities 15.

It will be noted that the three stations A, B and C lie in a straight line along a centre line X-X of the section.

The invert mechanism 9 comprises two neck-ring mechanisms 17 and 19 which operate alternately to transfer parisons from the blank station A to the intermediate station B. The neck ring mechanisms 17 and 19 are constructed substantially as described in our co-pending application EP 94302577.5 to which reference should be made for a detailed description.

In the operation of the section, parisons are formed at the blank station A in the parison moulds 1 and 3 with finish end portions in contact with neck-ring mould halves of one of the neck-ring mechanisms 17 and 19. These mechanisms operate alternately to transfer formed parisons from the blank station A to the intermediate station B where the parisons are positioned in the blow mould cavities 15 formed by the blow mould members 13 of the blow moulds 11.

A mould opening and closing mechanism for the blow moulds 11 is mounted in a carriage 100 which is supported by rollers 102 on a guide way 104 which is secured in a frame 110 of the section. The carriage 100 is arranged to be moved between an intermediate position, in which the blow moulds 11 are at the intermediate station B, and a final position, in which the blow moulds 11 are at the final forming station C, by a piston and cylinder device 106. The blow mould members 13 are supported by the mould opening and closing mechanism, by which they are moved between mould open (as shown on the right hand side of Figure 1 and mould closed positions (as shown on the left hand side of Figure 1. In the mould closed position the blow mould members 13 form a mould cavity 15 in conjunction with a base plate 108.

The carriage 100 is in the form of a closed box and air is supplied to the carriage through flexible bores (not shown) to provide air for cooling the mould members 13, and vacuum is supplied to the carriage through a flexible bore (not shown) to provide for the supply of vacuum to the mould cavities.

The carriage 100 and the mould opening and closing mechanism (Figure 6) is generally similar in construction to the blow mould opening and closing mechanism described in UK 9420014.4.

The blow mould members 13 are each mounted on conventional mould supports (not shown). Each blow mould also comprises a base plate 108. The mould members 13 are movable linearly, by movement of the mould supports inwardly into engagement with one another and the base plate 108 to define the mould cavities 15 and linearly outwardly away from one another, again by movement of the supports to open the blow mould.

The section comprises container supporting means at the final forming station C arranged to engage containers formed in the mould cavities 15 and to support them, and a dead plate 22 which is moveable between the final forming station C and a removal station B.

The container supporting means is provided in the form of a combined blowhead and take out support 24 [Figures 2, 3 and 4]. A bracket 26 is supported by the frame 110 of the section and supports a cylinder 28 having an upper end portion 30. Mounted in the cylinder 28 is a piston 32 which comprises a boss 34 extending downwardly from the cylinder 28 through the bracket 26 and a stepped internal chamber 36 having a smaller diameter portion 38 and a larger diameter portion 40 which is closed by an end plate 42. An air supply pipe 44 extends slidably through the end plate 42 and the upper end portion 30 of the cylinder 28 into the portion 40 of the chamber 36. A compression spring 46 acts between a lower end of the cylinder 28 and an upper flange 48 of the piston 32. Another compression spring 50 acts between a lower end of the portion 38 of piston 32 and a piston 52 fixed to an operating rod 54. An air supply pipe 56 leads into the interior of the cylinder 28 above the piston 32.

Secured to the boss 34 is a support plate 58 to which are fixed two downwardly extending pipes 60 each leading to a blowhead 62 (only shown diagrammatically). The plate 58 also supports two downwardly extending lugs 64 each of which has two links 66 pivoted to it. At their lower ends the links 66 support a pair of tongs 68. Pivoted to a mid portion of each link 66 is a toggle link 70, 70: the toggle links 70 are pivoted to a block 72 secured to the lower end portion of the operating rod 54.

In a rest portion of the blow head and take out support 24, shown in Figure 3a, both the cylinder 28 above the piston 32 and the chamber 36 above the piston 52 are vented. Consequently the spring 46 forces the piston 32, and consequently the support plate 58, the tongs 68 and the blowheads 62 into uppermost positions. The spring 50 forces the piston 52 upwardly in the chamber 36, and consequently the tongs 68 are open, because of relative movement of the block 72 and the support plate 58, which causes extension of the toggle links 70,70.

When the carriage 100 carries the blow moulds 11 into position at the final forming station C, the mouths of the partly formed containers in the blow moulds are positioned under the blowheads 62, 62. Air is then admitted into the cylinder 28 above the piston 32. This forces the piston 32 downwardly against the pressure of the spring 46, to carry the support plate 58, and thus the blowheads 62 downwards. The blowheads 62, 62 are arranged to descend close to the tops of the partly formed containers so that air passing down through the pipes 60 will pressurise the interior of the containers and complete the forming process. The blowheads can be arranged so that some of the air passing down through the pipes 60 escapes from the containers thereby internally cooling the containers. When the forming has been completed, the supply of air through the pipes 60 ceases and the blow moulds 11 then open, leaving the formed containers supported on the base plates 108.

Air is then supplied through the pipe 44 into chamber 36 above the piston 52. The piston 52, and with it the piston rod 54 and the block 72 are thus moved downwardly relative to the support plate 58, causing the toggle links 70 to move into the position shown in Figure 3 and the tongs

68 to close about the finish of the finally formed container.

The air in cylinder 28 above the piston 32 is then vented allowing the spring 46 to return piston 32 to the top of cylinder 28, carrying the support plate 58 so that the closed tongs 68 holding the containers lift the containers free from the base plates 108 in each mould [Figure 5b]. The carriage 100 then moves linearly to return the blow moulds 11 to the intermediate station B, leaving the containers suspended from the tongs 68 at the final forming station C.

The containers are then, as will now be described, deposited on the dead plate 22.

The dead plate 22 forms part of a movable unit 74 which is mounted on the carriage 100 for movement together with the blow moulds 11. [see Figure 2] The dead plate 22 is provided by the upper face of a rectangular box 76, and is provided, as is customary, with a plurality of apertures 78. Cooling air is supplied to the box 76 through a flexible pipe 80. Supported on the underside of the box 76 are two piston and cylinder devices 82, 84, which are supplied with operating air through flexible pipes (not shown). The piston and cylinder devices 82, 84 each support steadying bars 86, 88 respectively which are movable between elevated positions, in which they are positioned a small distance above the surface of the dead plate 22, and retracted positions in which they are retracted into recesses 90,92 in the dead plate 22. These steadying bars are elevated when the dead plate 22 is in the final forming station C, and serve to steady the containers as the dead plate 22 moves from the final forming station C to the removal station R. They are then retracted so that, in due course, the

containers can be pushed out off the dead plate 22 onto a conveyor (shown diagrammatically at 94) by a conventional pushout mechanism (not shown).

Thus as has been described, the containers are held suspended by the tongs 68 as the blow moulds are moved away from the final station C to the intermediate station B and the dead plate 22 is moved into the final station C below the suspended containers. After a short time, in which air blown through the box 76 will cool the container, the tongs 68 are opened and the containers drop onto the upper surface of the dead plate 22. At about this time, the devices 28 and 84 are operated to elevate the steadying bars 86,88.

The blow moulds at the intermediate station B close about parisons by now provided at the intermediate station, and the carriage 100 then moves to carry the blow moulds, with partly formed containers in them, into the final forming station C, and the just formed containers on the dead plate 22 from the final forming station C into the removal station R. The devices 82,84 are then operated to retract the bars 86,88 into the recesses 90,92 and a conventional pushout device then pushes the containers from the dead plate 22 onto the conveyor 94.

It will be understood that while the machine just described lifts the finally formed containers a small amount to enable the containers to clear the baseplates 108, it is possible in the alternative to drop the base plates 108 while the containers are held by the tongs to obtain such clearance.

CLAIMS

1 A section of an individual section glass forming machine comprising

a blank station, at which a gob of glass may be formed into a parison

a transfer mechanism for transferring a formed parison from the blank station to an intermediate station

a final forming station at which a container is finally formed in a blow mould assembly comprising blow mould members adapted to form a blow mould cavity, which blow mould assembly is arranged to move linearly between the intermediate station and the final forming station

container supporting means at the final forming station arranged to engage a container formed in the mould cavity and to support it

a dead plate moveable between the final forming station and a removal station,

wherein in the operation of the section

(a) the blow mould members open when the container is finally formed in the blow mould assembly at the final forming station and the container is engaged by the supporting means

(b) while the supporting means supports the container at the final forming station the blow mould assembly is moved from the final forming station to the intermediate station and the dead plate is moved from the removal station to the final forming station

(c) the supporting means releases the container onto the dead plate at the final forming station

(d) the dead plate moves from the final forming station to the removal station to carry the container out from the final forming station

2 A section according to Claim 1 wherein the mould members comprise two side mould members and a base plate, and the supporting means is arranged, when the side mould members are open, to lift the container slightly to clear it from the base plate.

3 A section according to Claim 1 wherein the mould members comprise two side mould members and a base plate, and the base plate is mounted for a small vertical movement and is arranged, when the side mould members open, to drop slightly to allow a container supported by the supporting means to be clear from the base plate.

4 A section according to Claim 1 wherein the container supporting means comprises tongs adapted to engage the finish of a container at the final forming station, and a blow head adapted to be moved into co-operation with the finish of the container to provide blowing air for the final forming operation.

5 A section according to Claim 1 wherein the dead plate is in the form of an enclosed chamber with openings on an upper flat surface thereof, cooling air being supplied to the chamber.

6 A section according to Claim 5 wherein the dead plate comprises vertical pusher bars movable between a lower, withdrawn position and an upper, operative position in which they support the containers on the dead plate as the dead plate moves from the final forming station to the removal station.

Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

Application number
GB 9510057.4

Relevant Technical Fields

(i) UK Cl (Ed.N) C1M (MEU, MFW)

(ii) Int Cl (Ed.6) C03B 9/453

Search Examiner
C A CLARKE

Date of completion of Search

Databases (see below)
(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

(ii) ONLINE: WPI

Documents considered relevant following a search in respect of Claims :-
1 TO 6

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

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